

# Claims

- [c1] 1. A method of motion detection for a 3D comb filter video decoder, comprising:  
sampling a composite video signal for obtaining a plurality of temporarily stored sampled data  $F_m P_{x,y}$ , wherein  $F_m P_{x,y}$  represents a sampled data of a  $y^{\text{th}}$  pixel on an  $x^{\text{th}}$  line of an  $m^{\text{th}}$  frame in the composite video signal, and  $m, x, y$  are positive integers greater than or equal to 0;  
and  
using  $F_{m+1} P_{x,y}$ ,  $F_m P_{x,y}$ ,  $F_{m-1} P_{x,y}$ , and  $F_{m-2} P_{x,y}$  to determine a motion/still status of the composite video signal.
- [c2] 2. The method of motion detection for a 3D comb filter video decoder of claim 1, wherein the step of determining the motion/still status of the composite video signal further comprises:  
using  $F_{m+1} P_{x,y}$ ,  $F_m P_{x,y}$ ,  $F_{m-1} P_{x,y}$ , and  $F_{m-2} P_{x,y}$  to calculate and obtain a plurality of max differences  $MD_{x,y}$ , wherein  $MD_{x,y}$  represents a max difference of the  $y^{\text{th}}$  pixel on the  $x^{\text{th}}$  line;  
averaging 4 max differences of the contiguous pixels selected to obtain a motion factor  $MF_{x,y}$ , wherein  $MF_{x,y}$  represents a motion factor of the  $y^{\text{th}}$  pixel on the  $x^{\text{th}}$  line;

and

detecting  $MF_{x,y}$  to determine the motion/still status of the  $y^{th}$  pixel on the  $x^{th}$  line in the composite video signal.

[c3] 3. The method of motion detection for a 3D comb filter video decoder of claim 2, wherein when it is determined that the composite video signal is a signal for an NTSC system, the step of sampling the composite video signal uses a frequency which is 4 times the subcarrier frequency in the composite video signal to sample the signal, and the signal is sampled when the subcarrier phase is equal to  $0$ ,  $0.5\pi$ ,  $\pi$ , and  $1.5\pi$ .

[c4] 4. The method of motion detection for a 3D comb filter video decoder of claim 3, wherein  $MD_{x,y}$  is calculated based on an equation:

$$MD_{x,y} = \text{Max}\{|F_m P_{x,y} - F_{m-2} P_{x,y}|, |F_{m+1} P_{x,y} - F_{m-1} P_{x,y}|\}.$$

[c5] 5. The method of motion detection for a 3D comb filter video decoder of claim 2, wherein when it is determined that the composite video signal is a signal for a PAL system, the step of sampling the composite video signal uses a frequency which is 4 times the subcarrier frequency in the composite video signal to sample the signal, and the signal is sampled when the subcarrier phase is equal to  $0.25\pi$ ,  $0.75\pi$ ,  $1.25\pi$ , and  $1.75\pi$ .

[c6] 6. The method of motion detection for a 3D comb filter video decoder of claim 5, wherein the step of calculating and obtaining  $MD_{x,y}$  further comprises:  
calculating and obtaining a plurality of luma differences  $LD_{x,y}$ , wherein  $LD_{x,y}$  represents a luma difference of the  $y^{th}$  pixel on the  $x^{th}$  line, and is calculated based on an equation:  

$$LD_{x,y} = | F_m P_{x,y} + F_{m-2} P_{x,y} - F_{m+1} P_{x,y} - F_{m-1} P_{x,y} |;$$
calculating and obtaining a plurality of intermediate differences  $IMD_{x,y}$ , wherein  $IMD_{x,y}$  represents an intermediate difference of the  $y^{th}$  pixel on the  $x^{th}$  line, and is calculated based on an equation:  

$$IMD_{i,2j-1} = \text{Max}\{ | F_{m+1} P_{i,2j-1} - F_{m-2} P_{i,2j-1} |, | F_m P_{i,2j-1} - F_{m-1} P_{i,2j-1} | \};$$

$$IMD_{i,2j} = \text{Max}\{ | F_{m+1} P_{i,2j} - F_m P_{i,2j} |, | F_{m-1} P_{i,2j} - F_{m-2} P_{i,2j} | \};$$
and  
calculating and obtaining  $MD_{x,y}$ , which is calculated based on an equation:  

$$MD_{x,y} = a * IMD_{x,y} + (1 - a) * LD_{x,y};$$
wherein,  $a$  is a real number greater than 0 and less than 1, and  $i, j$  are positive integers.

[c7] 7. The method of motion detection for a 3D comb filter video decoder of claim 2, wherein the step of obtaining  $MF_{x,y}$  further comprises:  
averaging 4 max differences of the contiguous pixels selected to obtain a plurality of max differences  $AMD_{x,h}$ , wherein  $AMD_{x,h}$  represents an average of max difference

of a  $h^{th}$  pixel on the  $x^{th}$  line,  $h$  is a positive integer, and

$AMD_{x,h}$  is calculated based on an equation:

$$AMD_{x,h} = (MD_{x,h} + MD_{x,h+1} + MD_{x,h+2} + MD_{x,h+3}) / 4; \text{ and}$$

selecting a minimum from the averages of max difference to obtain a motion factor  $MF_{x,y}$ , wherein  $MF_{x,y}$  represents a motion factor of the  $y^{th}$  pixel on the  $x^{th}$  line.

[c8] 8. The method of motion detection for a 3D comb filter video decoder of claim 7, wherein the step of selecting a minimum from the averages of max difference to obtain  $MF_{x,y}$  is based on an equation:

$$MF_{x,y} = \text{Min}(AMD_{x,y}, AMD_{x,y-1}, AMD_{x,y-2}, AMD_{x,y-3}).$$

[c9] 9. The method of motion detection for a 3D comb filter video decoder of claim 7, wherein the step of selecting a minimum from the averages of max difference to obtain  $MF_{x,y}$  is based on an equation:

$$MF_{x,y} = \text{Min}(AMD_{x,y}, AMD_{x,y-3}).$$

[c10] 10. The method of motion detection for a 3D comb filter video decoder of claim 2, wherein the step of detecting  $MF_{x,y}$  to determine the motion/still status of the  $y^{th}$  pixel on the  $x^{th}$  line in the composite video signal further comprises:

providing a threshold; and

comparing  $MF_{x,y}$  with the threshold, and when  $MF_{x,y}$  is greater than the threshold, it is determined that the  $y^{th}$

pixel on the  $x^{\text{th}}$  line in the composite video signal is in the motion status, otherwise, the  $y^{\text{th}}$  pixel on the  $x^{\text{th}}$  line in the composite video signal is in the still status.

- [c11] 11. The method of motion detection for a 3D comb filter video decoder of claim 10, wherein the motion factors  $MF_{x,y}$  are the motion factors of the  $m^{\text{th}}$  frame.